



PATENT
Attorney Docket No. 08009.0008-00

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:)
Toshiki MAEDA et al.)
Application No.: 10/715,525) Group Art Unit: 1745
Filed: November 19, 2003) Examiner: Rhee, J.
For: ACTIVE MATERIAL FOR) Confirmation No.: 4709
POSITIVE ELECTRODE OF LITHIUM)
SECONDARY BATTERY)

Attention: Mail Stop Appeal Brief-Patents
Commissioner for Patents
P.O. Box 1450
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Sir:

APPEAL BRIEF UNDER BOARD RULE §41.37

In support of the Notice of Appeal filed October 12, 2006, and further to Board Rule 41.37, Appellant presents this brief and enclose herewith a check for the fee of \$500.00 required under 37 C.F.R. § 1.17(c).

This Appeal Brief is being filed concurrently with a Petition for a four-month extension of time and the appropriate fee.

This Appeal responds to the July 12, 2006, final rejection of claims 1 and 3.

If any additional fees are required or if the enclosed payment is insufficient, Appellant requests that the required fees be charged to Deposit Account No. 06-0916.

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I. Real Parties In Interest

Sumimoto Metal Mining Co. Ltd., Toyota Jidosha Kabushiki Kaisha and Denso Corp. are the real parties in interest, as indicated by the assignment in their name, recorded in the U.S. Patent and Trademark Office on September 8, 2004, at Reel 015087, Frame 0820.

II. Related Appeals and Interferences

There are currently no other appeals or interferences, of which Appellant, Appellant's legal representative, or Assignees are aware, that will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

III. Status Of Claims

Claims 1 and 3 are pending in this application

Claim 2 is cancelled.

Claims 1 and 3 are finally rejected by the Examiner, and Appellants appeal the rejection of these claims. Further to 37 C.F.R. §41.37(c)(1)(iii) and (viii), the attached Appendix contains a clean copy of the claims involved in the appeal.

IV. Status Of Amendments

All amendments have been entered. No amendments under 37 C.F.R. §1.116 have been filed.

V. Summary Of Claimed Subject Matter

The claimed invention relates to active materials for novel lithium secondary batteries in which a lithium-nickel composite oxide is used as the active material for a positive electrode, including active materials that are capable of improving the initial capacity of such batteries. Specification, page 1 and claim 1. In another aspect, the claimed invention related to lithium secondary batteries comprising the aforementioned active materials as a positive electrode. Claim 2.

Specifically, one aspect of the claimed invention (claim 1) is an active material for a positive electrode of a lithium secondary battery, comprising a lithium-nickel composite oxide of the general formula $\text{Li}_x(\text{Ni}_{1-y}\text{Co}_y)_{1-z}\text{M}_z\text{O}_2$, where x, y, z and M are defined in a specified manner, e.g., as in claim 1. According to Rietveld analysis, the Li site occupancy rate for Li sites in a crystal of this lithium-nickel composite oxide ("LNO") is 98% or greater. Further, the average particle size of spherical secondary particles of the lithium-nickel composite oxide ranges from 5 μm to 15 μm . Finally, when the active material is subjected to a washing process, the difference between the specific surface area of the active material before the washing process and after the washing process is 1.07 m^2/g or less. Appellants have found that in order to obtain an active material that exhibits the claimed difference in specific surface area, the manner in which a lithium composite oxide is manufactured must be carefully controlled, e.g. as in the examples of the present specification.

Prior to this invention, a standard index for analyzing the overall initial capacity of an active material for a lithium secondary battery was the lithium site occupancy rate in the material. Specification, page 3. Appellants have found, however, that when the

lithium site occupancy rate in an LNO is 98% or more, it is difficult to correlate site occupancy with initial capacity. Specification, page 3, lines 13-17. To solve this problem, a new index correlating to initial capacity was necessary.

After considerable research in this area, Appellants found that when an LNO active material is subjected to a washing process, those LNO materials that exhibit only a relatively small change in surface area as a result of the washing process are capable of increasing the initial discharge capacity of a lithium secondary battery. Specification, page 7, lines 1 to 9 and page 9, lines 14 to 23. In particular, Appellants found that by utilizing a lithium composite oxide that exhibits the claimed difference in surface area as the active material of a positive electrode of a lithium secondary battery, the initial discharge capacity of the battery is improved. See Specification page 7, lines 1 to 9, page 9, lines 14 to 23, and Table 1 of the as-filed specification. As shown in Table 1 and the examples of the specification, only those LNO which possess the claimed difference in specific surface area are capable of exhibiting an initial discharge capacity of 164 mAh/g.

VI. Grounds of Rejection to be Reviewed On Appeal

Claims 1 and 3 are rejected under 35 U.S.C. § 102(b) as anticipated by European Patent Application No. EP 0 944 125 to Sunagawa et al. Final Office Action mailed July 12, 2006, page 2.

VII. Arguments

Each claim of the present application is separately patentable, and upon issuance of a patent will be entitled to a separate presumption of validity under 35 U.S.C. §282.

In the Final Office Action mailed July 12, 2006, the Examiner maintains that claims 1 and 3 are anticipated under 35 U.S.C. §102(b) by European Patent No. EP 0 944 125 to Sunagawa et al. ("Sunagawa"). Appellants respectfully disagree with and traverse this rejection for at least the following reasons.

To establish a rejection under 35 U.S.C §102, the Examiner must demonstrate that a reference teaches each and every element of a claim. See M.P.E.P § 2141. A claim is anticipated under §102 **only if** each and every element, as set forth in the claim, is found in a single prior art reference. M.P.E.P. § 2131 (emphasis added). In this case, the Examiner has failed to meet this burden for at least the following reasons.

Claim 1 recites, *inter alia*, "a lithium-nickel composite oxide of the general formula $\text{Li}_x(\text{Ni}_{1-y}\text{Co}_y)_{1-z}\text{M}_z\text{O}_2$, where...according to Rietveld analysis, the Li site occupancy rate for Li sites in a crystal of this lithium-nickel composite oxide is 98% or greater... and... when the active material is subjected to a washing process, the difference between the specific surface area of the active material before the washing process and after the washing process is $1.07 \text{ m}^2/\text{g}$ or less." Appellants maintain that the Examiner has not established that Sunagawa teaches a lithium-nickel oxide active material comprising a lithium-nickel composite oxide that exhibits the claimed Li site occupation rate and difference in specific surface area, as discussed below.

According to the Examiner, Sunagawa discloses a lithium secondary battery using an active material of the same general formula as the claimed active material. Non-Final Office Action mailed November 2, 2005, page 2. Further, the Examiner asserts that the average particle size of Sunagawa's active material falls within the claimed range. *Id.* The Examiner also indicates that the specific surface area of Sunagawa ranges from 0.15 to 2.0m²/g. *Id.* The Examiner acknowledges, however, that Sunagawa does not expressly teach an active material having the claimed lithium site occupancy rate and difference in specific surface area. *Id.* at 2-3; Final Office Action mailed July 12, 2006, pages 2-3. Nonetheless, the Examiner maintains that Sunagawa anticipates each and every element of claims 1 and 3. Final Office Action, pages 2.

The Examiner's position is predicated on two arguments of inherency. First, with respect to the claimed lithium site occupancy rate, the Examiner maintains that "[s]ince Sunagawa et al. discloses the same active material desired by the applicant, it is inherent that according to the Rietveld analysis, the Li site occupancy rate for the Li site is 98% or greater." Non-Final Office Action mailed November 2, 2005, page 2; Final Office Action mailed July 12, 2006, pages 2-3. Second, with respect to the claimed difference in surface area before and after a washing process, the Examiner asserts that "Sunagawa discloses the same active material which is expressed by [the claimed] general formula... and that the specific surface area is between 0.15 to [2.0m²/g]..." *Id.* at 3-4. From this, the Examiner concludes that "it is inherent that the difference between the specific surface area of the active material [of Sunagawa] before the washing process and after the washing process is 1.07m²/g or less." *Id.* at 4. Finally,

the Examiner asserts that "data needs to be available that controlling the manufacturing process of [Applicant's] lithium composite oxide... differ[s] from the lithium composite oxide of the prior art." *Id.* at 3.

Appellants respectfully disagree with and traverse the Examiner's continued assertion that Sunagawa "inherently" possesses the claimed lithium site occupancy rate and difference in specific surface area. As stated in M.P.E.P. §2112 (IV),

The fact that a certain result or characteristic **may** occur or be present in the prior art is **not** sufficient to establish the inherency of that result or characteristic. *In re Rijckaert*, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993)... "To establish inherency, [the] **extrinsic evidence 'must** make clear that the missing descriptive matter is **necessarily** present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. **Inherency, however, may not be established by probabilities or possibilities.** The mere fact that a certain thing **may** result from a given set of circumstances is **not** sufficient." *In re Robertson*, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999) (citations omitted)... In relying upon the theory of inherency, the examiner **must** **provide** a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art. *Ex parte Levy*, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990). (emphasis added).

Appellants acknowledge that where claimed and prior art products are identical or substantially identical in structure or composition, or are produced by identical or substantially identical processes, a prima facie case of either anticipation or obviousness has been established. *In re Best*, 562 F.2d 1252, 1255 (CCPA 1977). However, this prima facie case can be rebutted by evidence showing that the prior art products do not necessarily possess the characteristics of the claimed product. *Best*, 562 F.2d at 1255. As discussed below and in the arguments of record, the intrinsic evidence in the present specification clearly establishes that the lithium composite oxide

of Sunagawa **does not necessarily** exhibit the claimed lithium site occupancy rate and difference in specific surface area.

In Table 1 of the specification (reproduced below), Applicants report the lithium occupancy rates for 11 examples and 5 comparative examples.

Table 1

	Li Site Occupancy Rate (%)	Average Particle Size (μm)	Specific Surface Area (m^2/g)			Initial Capacity (mAh/g)
			Before Washing	After Washing	Difference	
ex-1	98.58	9.4	0.57	1.42	0.85	166.5
ex-2	98.20	8.8	0.53	1.45	0.92	168.2
ex-3	99.05	12.2	0.59	1.53	0.94	167.3
ex-4	98.25	10.0	0.65	2.04	1.39	163.7
ex-5	98.28	8.2	0.52	1.91	1.39	160.0
ex-6	98.45	10.0	0.62	1.94	1.32	159.7
ex-7	98.46	9.0	0.70	1.91	1.21	163.7
ex-8	98.41	9.0	0.67	1.99	1.32	162.9
ex-9	98.77	9.8	0.72	1.79	1.07	165.7
ex-10	98.33	5.0	0.87	1.89	1.02	164.0
ex-11	98.45	15.0	0.53	1.52	0.99	164.1
com-1	97.82	8.7	0.62	1.71	1.09	162.9
com-2	97.68	8.3	0.68	2.01	1.33	163.3
com-3	97.86	10.1	0.60	1.87	1.27	161.1
com-4	98.25	4.8	0.88	2.11	1.23	163.5
com-5	98.28	16.0	0.49	1.70	1.21	159.7

ex : example; com : comparative example

As discussed on pages 11 and 12 of the specification, the composition utilized to form the active material of examples 1-11 and comparative examples 1-5 **is identical**.

(emphasis added). As shown in Table 1 however, comparative examples 1-3 **do not** exhibit the claimed lithium site occupancy rate. Moreover, **none** of the comparative examples exhibit the claimed difference in specific surface area.

In view of the data presented in Table 1 of the specification, Appellants submit that even if, *arguendo*, the lithium composite oxide of Sunagawa is considered to fall within the scope of the compositional elements recited in claims 1 and 3, this similarity in composition **is not** sufficient to establish that Sunagawa's lithium composite oxide

necessarily possess the claimed lithium site occupancy rate and difference in specific surface area. Indeed, as shown in Table 1, **identical compositions** exhibit these properties to widely varying degrees. Appellants again submit, however, that "inherency...**may not** be established by probabilities or possibilities. The mere fact that a certain thing **may** result from a given set of circumstances is **not** sufficient" to establish inherency. *In re Robertson*, 169 F.3d 743, 745 (Fed. Cir. 1999) (citations omitted) (emphasis strongly added).

For at least the foregoing reasons, Appellants submit that Sunagawa fails to teach all each and every element of claims 1 and 3. Specifically, Sunagawa fails to teach an active material for a lithium secondary battery comprising a lithium composite oxide that exhibits the claimed lithium site occupancy rate and difference in specific surface area, much less a lithium secondary battery comprising such an active material. Moreover, in view of the data in Table 1 of the present specification, the Examiner has not presented a sufficient basis upon which to establish that Sunagawa inherently exhibits the claimed properties.

For at least the foregoing reasons, the §102(b) rejection of claim 1 under 35 U.S.C. §102(b) as anticipated by Sunagawa is improper and should be withdrawn. Further, as claim 3 is dependant from claim 1, the rejection of this claim under §102(b) is also improper, and should also be withdrawn.

VIII. Conclusion

For at least the foregoing reasons, pending claims 1 and 3 are allowable, and reversal of the Examiner's rejection is respectfully requested.

To the extent any extension of time under 37 C.F.R. §1.136 is required to obtain entry of this Appeal Brief, such extension is hereby respectfully requested. If there are any fees due under 37 C.F.R. §§1.16 or 1.17 which are not enclosed herewith, including any fees required for an extension of time under 37 C.F.R. §1.136, please charge such fees to our Deposit Account No. 06-0916.

Respectfully submitted,

FINNEGAN, HENDERSON, FARABOW,
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Dated: March 15, 2007

By: /David W. Hill/
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Claims Appendix to Appeal Brief Under Rule 41.37(c)(1)(viii)

Claim 1. An active material for a positive electrode of a lithium secondary battery, comprising a lithium-nickel composite oxide of the general formula $\text{Li}_x(\text{Ni}_{1-y}\text{Co}_y)_{1-z}\text{M}_z\text{O}_2$, where:

$$0.98 \leq x \leq 1.10;$$

$$0.05 \leq y \leq 0.4;$$

$$0.01 \leq z \leq 0.2; \text{ and}$$

M is chosen from at least one element selected from the group of Al, Zn, Ti, and Mg; wherein:

- a. according to Rietveld analysis, the Li site occupancy rate for Li sites in a crystal of the lithium-nickel composite oxide is 98% or greater;
- b. the average particle size of spherical secondary particles of the lithium-nickel composite oxide ranges from 5 μm to 15 μm ; and
- c. when the active material is subjected to a washing process, the difference between the specific surface area of the active material before the washing process and after the washing process is 1.07 m^2/g or less.

Claim 3. A lithium secondary battery comprising the active material claims in claim 1 for the positive electrode.

Evidence Appendix to Appeal Brief Under Rule 41.37(c)(1)(ix)

There is no extrinsic evidence being cited or relied upon by Appellants in this case.

Related Proceedings Appendix to Appeal Brief Under Rule 41.37(c)(1)(x)

There are no related Appellate proceedings or decisions to be cited in this case.